

Assessment of Dental Students, Interns and General Practitioners' Knowledge of the Pharmaceutical Management of Temporomandibular Joint Disorders: A Cross-Sectional Study

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Abstract

Orofacial pain (OFP), defined as pain that comes from the hard and soft tissues of the face, head, and neck, is an unpleasant sensory and emotional experience linked to real or potential tissue damage that has a detrimental effect on the quality of life of patients.(1) The aim of the present study has been designed to assess and compare the knowledge regarding pharmaceutical management of Temporomandibular joint disorders midst dental students, interns, and general practitioners in Saudi Arabia. This questionnaire-based observational cross-sectional study was conducted on dental students, interns & general practitioners in Saudi Arabia. The scoring for the knowledge section was done as follows. Every accurate response received a score of one, while no answers received a score of zero. Based on their overall score, the survey respondents were categorised as having low, fair, or high levels of knowledge as follows: 1–5=poor, 6–9=fair, and 10–13=high. Comparisons based on categorical variables were made using the chi-square test, and significance was deduced at $p < 0.05$. It was evident from the present study that the general practitioners had more experience and knowledge regarding pharmaceutical management of Temporomandibular joint disorders than dental interns and students.

INTRODUCTION

Temporomandibular joint disorders (TMD) represent a common health problem in the general population, with a high reported prevalence between 40% to 60%.(2)Due to the involvement of the masticatory muscles, temporomandibular joint, and related tissues, patients with TMD typically experience muscle and/or joint pain on palpation and during mandibular motions, joint crepitations, and a potential limitation in mandibular range of motion.(3)Along with other indicators and symptoms, headaches and sleep issues may simultaneously manifest, impacting the quality of life as well.(4)

The causes of TMD are diverse and not fully understood, including organic TMJ disorders, trauma, malocclusion, and stress.The factors that have been studied for their involvement in TMD are arranged into three categories, namely "predisposing", "initiating," and "perpetuating." (5)

Over the past 25 years, pharmaceutical treatments have been extensively employed to treat TMD syndrome. Nonsteroidal anti-inflammatory medications (NSAIDs), opioids, corticosteroids, anxiolytics, muscle relaxants, antidepressants, and anticonvulsants are the top pharmaceuticals used to treat TMD.(6)Reassurance and education, physical and splint therapy, straightforward analgesia and other medications, surgical intervention, or a combination of treatments are all possible TMD treatments. The majority of TMD patients can be treated without surgery.(5)Majority of these patients can be managed by dental professionals instead of referring them to medical doctors or specialists if they have been adequately trained to be competent enough to diagnose and treat such cases.

The predisposition of TMD in females and younger age groups was a prevalent finding in earlier investigations.(7,8)Moreover, studies have shown that dentists' level of knowledge in the diagnosis and management of chronic, non-dental Oro-Facial Pain (OFP) & TMD was insufficient.(9,10)Another factor would be that certain dental schools provide such patients little clinical training or little theory on OFP or TMD.(11)The majority of dental colleges in Saudi Arabia, like in many dental schools, only include TMD themes in prosthodontics, oral surgery, oral pathology, oral medicine, and oral diagnosis courses.(9)Additionally, there is minimal to no clinical application on authentic TMD patients. (12) It's interesting to note that a study conducted in Spain found that general dentists seem to be good at identifying the cause of an illness but not in managing it.(13)Also, there is a lack of data regarding knowledge about the pharmacological management of TMDs by dental professionals.Additionally, newly trained dentists might not be sufficiently knowledgeable about TMD. They may lack the necessary practical expertise to correctly diagnose and treat patients with TMJ issues or to refer those who require specialized treatment.(14)So this study has been designed to assess and compare the knowledge regarding pharmaceutical management of Temporomandibular joint disorders among dental students, interns and general practitioners in Saudi Arabia.

Methodology

This questionnaire-based observational cross-sectional study was conducted on dental students, interns & general practitioners in Saudi Arabia during the period from March 13th – 23rd,2022. A universal sampling method will be used and will include all the completely filled responses collected during the entire duration of the study.By purposive sampling technique, all final-year dental students and interns from various government and private dental schools and all general Practitioners with a minimum of one-yearof clinical experience who have consented to participate in the study will be included in the study.

The online questionnaire Survey was scheduled to be done in March 2022. The questionnaire was tested for content validity by two experts in the field. The final questionnaire was administered on an online platform using google forms and comprised five socio-demographic questions and 13 questions on TMDs. All completed responses from participants satisfying inclusion and exclusion criteria will be considered for the study. A Pilot study was carried out among five subjects each, dental students, interns, and general practitioners, to know the feasibility of the research and to make modifications tothe questionnaire if required.

The scoring for the knowledge section was done as follows. The scoring pattern was +1 for every correct answer and 0 for unanswered questions. The survey subjects were classified as having low, fair or high levels of knowledge based on their total score as follows; 1-5=low ,6-9=fair and 10-13= high. The data were entered in Microsoft Excel. The responses were analyzed using SPSS Version 26 Software, and descriptive statistics were done. The chi-square test was used to make comparisons based on categorical variables, and the level of significance was inferred at $p \leq 0.05$.

Result

Table 1: Demographic Profile

Variables	Frequency	Percentage
Gender		
Male	109	69.9
Female	47	30.1
Participant		
Dental Intern	74	47.4
General Practitioner	42	26.9
Senior Dental Student	40	25.6
Place of work		
Clinics/Private practice	42	26.9
Governmental College	97	62.2
Private College	17	10.9
Institutional attachment		
Currently Not Working	7	16.7

Work Experience	Governmental Hospital	8	19.0
	Primary Health Care Centre	6	14.3
	Private Clinics/Hospital	14	33.3
	University Clinics/Hospital	7	16.7
	From 2 to 4 years	10	23.8
	Less than 2 years	28	66.7
More than 4 years	4	9.5	

The data tabulated in Table 1 shows the participants' demographic profiles. As per the data collected, out of a total of 156 participants- 109 (69.9%) were males, and 47 (30.1%) were females. Out of 156 total participants- 74 (47.4%) Dental Interns, 42 (26.9%) General Practitioners, 40 (25.6%) Senior Dental Students were included in the present study. The participants were working in either Clinic (42; 26.9%), Government colleges (97; 62.2%), or Private colleges (17;10.9%), and 10 participants (23.8%) had work experience ranging from 2 to 4 years, 28 (66.7%) had an experience of fewer than two years, and 4 (9.5%) had an experience of more than four years.

Table 2: Distribution of study subjects for responses

Question	Participants			X ² Value	p-value
	Dental Intern	Dental Student	General practitioner		
Have you ever managed Temporomandibular Joint Disorder (TMD) before?					
No	50 (46.7)	35 (32.7)	22 (20.6)	11.797	0.003*
Yes	24 (49.0)	5 (10.2)	20 (40.8)		
The most common management protocol for TMD					
I don't know	6 (60.0)	3 (30.0)	1 (10)	2.651	0.618
Non-Surgical Protocol	67(46.5)	36 (25.0)	41 (28.5)		
Surgical Protocol	1 (50.0)	1 (50.0)	0 (0)		
Pharmaceutical agents are used alone as a non-surgical protocol for the management of TMD					
I don't Know	8 (29.6)	11 (40.7)	8 (29.6)	5.208	0.267
No	49 (51.6)	21 (22.1)	25 (26.3)		
Yes	17 (50.0)	8 (23.5)	9 (26.5)		
Analgesics, Corticosteroids and anxiolytics are used to manage which type of pain associated with TMD					
Acute Pain	32 (43.8)	20 (27.4)	21 (28.8)	12.172	0.058
Both Acute and Chronic Pain	25 (67.6)	5 (13.5)	7 (18.9)		
Chronic Pain	6 (33.3)	4 (22.2)	8 (44.4)		
I don't know	11 (39.3)	11 (39.3)	6 (21.4)		
Antidepressants are used to manage which type of pain associated with TMD					
Acute Pain	2 (22.2)	3 (33.3)	4 (44.4)	4.607	0.595
Both Acute and Chronic Pain	5 (62.5)	2 (25.0)	1 (12.5)		
Chronic Pain	43 (50.0)	19 (22.1)	24 (27.9)		
I don't know	24 (45.3)	16 (30.2)	13 (24.5)		
NSAIDs, Muscle relaxants and local anesthesia are used to manage which type of pain associated with TMD					
Acute Pain	24 (45.3)	9 (17.0)	20 (37.7)	10.760	0.096
Both Acute and Chronic Pain	25 (47.2)	15 (28.3)	13 (24.5)		
Chronic Pain	13 (68.4)	4 (21.1)	2 (10.5)		
I don't know	12 (38.7)	12 (38.7)	7 (22.6)		

NSAIDs used for the management of TMD and to achieve an anti-inflammatory effect should be taken for a minimum of?

1 week	12 (41.4)	9 (31.0)	8 (27.6)		
2 weeks	22 (40.7)	13 (24.1)	19 (35.2)		
3 weeks	9 (90.0)	0 (0)	1 (10.0)	11.314	0.185
4 weeks	4 (50.0)	3 (37.5)	1 (12.5)		
I don't know	27 (49.1)	15 (27.3)	13 (23.6)		

frequency of injecting Botox in the muscles of mastication for treatment of bruxism and muscle spasm associated with TMD

Annually	6 (50.0)	4 (33.3)	2 (16.7)		
Monthly	2 (66.7)	1 (33.3)	0 (0)		
Every 2-6 months	14 (48.3)	5 (17.2)	10 (34.5)	16.935	0.031*
Every 6-8 months	26 (65.0)	3 (7.5)	11 (27.5)		
I don't know	26 (36.1)	27 (37.5)	19 (26.4)		

optimal time period to shift the patient from non-surgical to surgical protocol if significant symptoms persistent is more than?

3-6 months	12 (31.6)	9 (23.7)	17 (44.7)		
6-9 months	16 (59.3)	5 (18.5)	6 (22.2)		
9-12 month	4 (57.1)	2 (28.6)	1 (14.3)	10.594	0.226
A year	12 (44.4)	8 (29.6)	7 (25.9)		
I don't know	30 (52.6)	16 (28.1)	11 (19.3)		
Total	74 (100)	40(100)	42 (100)		

*p<0.005

The above table (table 2) shows the variable distribution of study subjects for responses. It was worth noting that out of 156 participants, 107 participants had never managed TMD before at the time of conducting the study- out of which 20 GPs (40.8%) had managed TMDs before & the result was statistically significant (p<0.005) with a chi-square value of 11.797. It was also noted that 73 out of 156 participants agreed that Analgesics, Corticosteroids, and anxiolytics are used to manage Acute pain associated with TMD- out of which, 32 Dental Interns (43.8%) giving the correct response, although the result was statistically insignificant. Also, 69 participants out of 156 agreed that the frequency of injecting Botox in the muscles of mastication for treatment of bruxism and muscle spasm associated with TMD should be between 6 to 8 months (Chi-square value- 16.935; p-value:0.031). It was noted that again 26 Dental Interns had a majority correct reponse (65%).

Table 3: Distribution of responses of study subjects regarding the Pharmacological agent used as a first line for the management of TMD & the agent that is commonly combined with NSAIDs in the management of muscular pain associated with TMD.

Response	Pharmaceutical agents used as a first line for the management of TMD			Agent which is commonly combined with NSAIDs in the management of muscular pain associated with TMD		
	Dental Intern	Dental student	General Practitioner	Dental Intern	Dental student	General Practitioner
Analgesics	21 (45.7)	12 (26.1)	13 (28.3)	7 (36.8)	7 (36.8)	5 (26.3)
Antibiotics	1 (50.0)	0 (0)	1 (50.0)	7 (87.5)	0 (0)	1 (12.5)
Anticonvulsants	1 (50.0)	1 (50.0)	0 (0)	0 (0)	1 (50.0)	1 (50.0)
Antidepressants	-	-	-	1 (50.0)	0 (0)	1 (50.0)
Anxiolytic	1 (50.0)	1 (50.0)	0 (0)	2 (50.0)	1 (25.0)	1 (25.0)
Corticosteroids	2 (100)	0 (0)	0 (0)	1 (25.0)	3 (75.0)	0 (0)
Muscle Relaxants	22 (62.9)	7 (20.0)	6 (17.1)	40 (51.9)	14 (18.2)	23 (29.9)

Local anesthesia	-	-	-	0 (0)	0 (0)	1 (100.0)
NSAIDs	9 (29.0)	6 (19.4)	16 (51.6)	-	-	-
I don't know	17 (47.2)	13 (36.1)	6 (16.7)	16 (41.0)	14 (35.9)	9 (23.1)
Total	74 (100)	40(100)	42 (100)	74 (100)	40(100)	42 (100)

Table 3 shows the distribution of responses of the study subjects regarding the Pharmacological agent used as a first line for the management of TMD & the agent that is commonly combined with NSAIDs in the direction of muscular pain associated with TMD. Most participants (46) agreed that Analgesics should be used as the first line, followed by Muscle Relaxants (35 participants) with 21 Dental Interns choosing Analgesics as the correct response (45.7%); whereas 77 participants agreed that muscle relaxants are most commonly combined with NSAIDs in the management of muscular pain in TMDs; 40 Dental Interns (51.9%) choosing Muscle relaxants as the adjuvant to NSAIDs. Most of the Dental interns and General Practitioners had a thorough knowledge of the first line and supportive therapy to manage TMDs.

Table 4: Comparison of overall mean scores for correct answers among participant categories.

PARTICIPANT CATEGORY	N	Mean	Std. Deviation	95% Confidence Interval for Mean		Minimum	Maximum
				Lower Bound	Upper Bound		
Dental intern	74	7.99	2.82	7.33	8.64	2.00	15.00
Dental student	40	7.33	2.88	6.40	8.25	3.00	15.00
General practitioner	42	9.07	3.85	7.87	10.27	2.00	18.00
Total	156	8.11	3.19	7.60	8.61	2.00	18.00

ANOVA p value=0.041(Significant as p <0.05)

On comparison of overall mean scores for correct answers among participant categories, it was observed that the mean scores were 7.99 ± 2.82 , 7.33 ± 2.88 and 9.07 ± 3.85 among dental interns, dental students, and general dental practitioners, respectively, with a statistically significant difference ($p < 0.05$) observed between the mean knowledge scores of general practitioners and dental students based on ANOVA and Tukeys Post hoc test. This is clearly indicated that general practitioners had better knowledge than dental interns and students regarding the pharmaceutical management of temporomandibular joint disorders. Though the dental interns had a better mean knowledge score than dental students, the difference was statistically insignificant ($p > 0.05$). It is also noteworthy that the maximum score of 18 out of total marks of 19 was observed only in the general practitioner group.

Table 5: Comparison of mean scores for correct answers for 'The pharmaceutical agents can be used in the management of TMD' among participant categories.

Participant Category	N	Mean	Std. Deviation	95% Confidence Interval for Mean		Minimum	Maximum
				Lower Bound	Upper Bound		
Dental intern	74	3.11	1.40	2.78	3.43	.00	6.00
Dental student	40	2.88	1.38	2.43	3.32	1.00	6.00
General practitioner	42	3.50	1.61	3.00	4.00	1.00	8.00
Total	156	3.15	1.46	2.92	3.39	.00	8.00

ANOVA p value=0.145 (Not significant as $p > 0.05$)

On comparison of overall mean scores for correct answers among participant categories for the question regarding the pharmaceutical agents that can be used in the management of TMD, it was observed that the mean scores were 3.11 ± 1.40 , 2.88 ± 1.38 and 3.50 ± 1.61 among dental interns, dental students and general dental practitioners respectively with no

statistically significant difference ($p < 0.05$) observed between the mean knowledge scores of the subjects based on ANOVA and Tukeys Post hoc test. As the highest mean scores were observed among the general practitioners group, it is evident that general practitioners had better knowledge than dental interns and students regarding the pharmaceutical management of temporomandibular joint disorders.

Table 6: Distribution of study subjects based on knowledge category.

Participant *Knowledge scores Cross tabulation			Knowledge category*			Total
PARTICIPANT	Dental intern	Count	Poor	Fair	Good	74
		% within PARTICIPANT	25	45	4	
		% within Knowledge category	33.8%	60.8%	5.4%	47.4%
	Dental student	Count	22	17	1	40
		% within PARTICIPANT	55.0%	42.5%	2.5%	100.0%
		% within Knowledge category	37.3%	19.8%	9.1%	25.6%
	General practitioner	Count	12	24	6	42
		% within PARTICIPANT	28.6%	57.1%	14.3%	100.0%
		% within Knowledge category	20.3%	27.9%	54.5%	26.9%
Total		Count	59	86	11	156
		% within PARTICIPANT	37.8%	55.1%	7.1%	100.0%
		% within Knowledge category	100.0%	100.0%	100.0%	100.0%

Pearson Chi-Square Value-10.588 P value-0.032

Considering the proportion of participants based on knowledge scores, only 14.3% of general practitioners, 5.3% of dental interns and 2.3% of dental students were in the 'good' knowledge category while the corresponding proportions for 'poor' category were 28.6%, 33.8% and 55.0% respectively among the participant groups. The highest proportion of general practitioners (57.1%) and dental interns (60.8%) belonged to the 'fair' knowledge category whereas a vast proportion of dental students (55.0%) belonged to the 'poor' knowledge category. The distribution showed statistically significant difference ($p < 0.05$).

Discussion

The American Association of Dental Research (AADR) has classified a set of musculoskeletal and neuromuscular illnesses affecting temporomandibular joints, muscles, and tissues as temporomandibular disorders (TMDs). (15) TMDs are categorized as musculoskeletal disorders and be a significant contributor to non-dental pain in the orofacial region. (1)

This group of disorders clinically presents with various signs and symptoms, including TMJ sounds, headache, tooth grinding & pain in the Oro-facial region. Identifying possible signs and symptoms of TMDs is crucial to early diagnosis and suitable treatment. The signs and symptoms of TMDs tend to occur more frequently in females and peak during the reproductive years, whereas they are smaller in number among children and adolescents, and the elderly. (16) However, due to the variable clinical picture in various patients and in the same patient at different times, diagnosing this clinical entity may be challenging. (2) The causes of TMD are multifaceted it includes emotional stress, occlusal interferences, tooth loss, postural deviation, masticatory muscular dysfunction, internal and exterior TMJ structure alterations, and numerous correlations of these factors. (17)

The present study shows that the knowledge of dental students about the pharmaceutical management of TMDs differs significantly from the knowledge of general practitioners & interns. Several studies have been conducted in the past in various countries and regions to identify the knowledge and information regarding the TMDs. As there is a lack of studies done in Saudi Arabia, the present research aims to dig up in-depth knowledge regarding the pharmaceutical management of Temporomandibular joint disorders among dental students, interns, and general practitioners.

In the present study, out of a total of 156 participants- 109 (69.9%) were males, and 47 (30.1%) were females. Out of 156 total participants- 74 (47.4%) Dental Interns, 42 (26.9%) General Practitioners, 40 (25.6%) Senior Dental Students were included in the present study.

It was worth noting that out of 156 participants, 107 participants had never managed TMD before at the time of conducting the study & the result was statistically significant ($p < 0.05$) with a chi-square value of 11.797. This might be because almost 73% of the participants were Dental Interns & students, and hence there might be a possibility that they might not have yet managed this group of lesions. It was also noted that 73 out of 156 participants agreed that Analgesics, Corticosteroids, and anxiolytics are used to manage Acute pain associated with TMD with a Chi-square value of 12.172 with statistically significant results ($p < 0.05$). This shows that the knowledge regarding the use of particular pharmaceutical agents was found to be satisfactory among all the groups.

In the current study, on comparison of overall mean scores for correct answers among participant categories, it was noted that the mean scores were 7.99 ± 2.82 , 7.33 ± 2.88 and 9.07 ± 3.85 among dental interns, dental students and general dental practitioners, respectively with a statistically significant difference ($p < 0.05$) observed between the mean knowledge scores of general practitioners and dental students based on ANOVA and Tukeys Post hoc test. This is clearly indicated that general practitioners had better knowledge than dental interns and students regarding the pharmaceutical management of temporomandibular joint disorders. Though the dental interns had a better mean knowledge score than dental students, the difference was statistically insignificant ($p > 0.05$). In a study done by Lopez et al.(13)63% of respondents took NSAIDs to treat TMD, with no discernible changes in use between the two groups, it was observed. However, the use of muscle relaxants was more frequent in the group of dentists with over five years of professional experience than in the first group – with just 38% for the latter. This is in accordance with our study, where most of the participants agreed to the use of Analgesics & muscle relaxants as the first line of treatment (Table 3). Also, Mozhdeh et al.(18)revealed that 41% of general dentists in Italy have adequate knowledge of TMD. A study conducted in Seoul(19) evaluated dentists' understanding of TMD. The findings of this study indicated that participants had a solid understanding of the mental and psychophysiological diseases associated with the etiology of TMD. Results from this investigation generally agreed with what we discovered.

Also, in the present study, on comparison of overall mean scores for correct answers among participant categories for the question regarding the pharmaceutical agents that can be used in the management of TMD, it was observed that the mean scores were 3.11 ± 1.40 , 2.88 ± 1.38 and 3.50 ± 1.61 among dental interns, dental students and general dental practitioners respectively. As the highest mean scores were observed among the general practitioners' group, it is evident that general practitioners had better knowledge than dental interns and students regarding the pharmaceutical management of temporomandibular joint disorders. It's possible that while their years of professional experience grew, their expertise may have decreased as a result. This was also noted by an independent survey done in Turkey(20) and another study done by Mozhdeh et al.(18) in Italy.

Considering the proportion of participants based on knowledge scores, only 14.3% of general practitioners, 5.3% of dental interns, and 2.3% of dental students were in the 'good' knowledge category, while the corresponding proportions for 'poor' category were 28.6%,33.8%, and 55.0% respectively among the participant groups. The highest proportion of general practitioners (57.1%) and dental interns (60.8%) belonged to the 'fair' knowledge category, whereas a vast proportion of dental students (55.0%) belonged to the 'poor' knowledge category. The distribution showed a statistically significant difference ($p < 0.05$). Similar results were reported by Al-Khotani et al.(9) 2015; in Saudi Arabia and Sweden, general dentists, oral and maxillofacial surgeons, orthodontists, and pedodontists all lacked appropriate expertise in TMD.(9) In a study conducted by Osiewicz et al.,(21)only 6.5% of the participants said their knowledge of TMD was very good, and almost a quarter thought it was insufficient or poor. This study sought to determine the level of self-perceived knowledge among Polish dentists regarding diagnosing and treating TMD and their knowledge of its etiology and symptoms. In another study conducted by Patil S et al., it was found that in comparison to GDPs, the majority of specialists had a good level of knowledge about TMDs. (22) They came to a conclusion—shared by the majority of survey respondents—that the existence of low/fair understanding among GDPs may be due to a lack of attention on TMDs in India's undergrad programs. According to a survey by Baharvand et al., carried out in Iran, GDPs, specialists, and academic experts all agreed that undergraduate dentistry instruction on TMDs and orofacial discomfort was inadequate. The necessity to improve the undergraduate education in this particular discipline is highlighted by this (23).

Conclusion

According to the present study, the general practitioners had more experience and knowledge regarding pharmaceutical management of Temporomandibular joint disorders as compared to dental interns and dental students. Dental interns fared better than dental students but did not show any expertise good enough to obtain a statistically significant difference. The current study clearly points out the need for the inclusion of greater focus and training regarding temporomandibular joint disorders and its management among dental students and interns to empower them to confidently deal with such case scenarios in their clinical practice. The lower proportion of study subjects with 'good' knowledge in all participant categories is also suggestive towards requirement of organizing and attending continuing dental education programs to keep dental professionals abreast with the latest developments regarding surgical and non-surgical management of temporomandibular joint disorders.

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